

US-PAT-NO: 5748437

DOCUMENT-IDENTIFIER: US 5748437 A

TITLE: Fluid separation system with flow-through capacitor

DATE-ISSUED: May 5, 1998

US-CL-CURRENT: 361/302; 204/600 ; 204/647 ; 204/671 ;
210/198.2 ; 210/656

APPL-NO: 08/ 653832

DATE FILED: May 28, 1996

PARENT-CASE:

REFERENCE TO PRIOR APPLICATIONS This application is a divisional of U.S. Ser. No. 08/439,310 filed May 11, 1995, now U.S. Pat. No. 5,547,581, which is a divisional of U.S. Ser. No. 08/194,609 filed Feb. 10, 1994, now U.S. Pat. No. 5,415,768 issued May 16, 1995, which is a continuation-in-part of U.S. patent application Ser. No. 08/027,699, filed Mar. 8, 1993, now U.S. Pat. No. 5,360,540 issued Nov. 1, 1994 which is a divisional of U.S. patent application Ser. No. 07/819,828, filed Jan. 13, 1992, now U.S. Pat. No. 5,200,068, issued Apr. 6, 1993, which is a continuation-in-part application of U.S. patent application Ser. No. 07/792,902, filed Nov. 15, 1991, now U.S. Pat. No. 5,192,432, issued Mar. 9, 1993, which is a continuation of U.S. patent application Ser. No. 07/512,970, filed Apr. 23, 1990, now abandoned. U.S. patent application Ser. No. 07/760,752, a divisional application of U.S. patent application Ser. No. 07/512,970, was filed on Sep. 16, 1991 and is now U.S. Pat. No. 5,196,115, issued Mar. 23, 1993. All of these patents and the application are hereby incorporated by reference.

----- KWIC -----

Abstract Text - ABTX:

A flow-through capacitor and a controlled charge chromatography column system using the capacitor for the purification of a fluid-containing material, which column comprises an inlet for a fluid to be purified and an outlet for the discharge of the purified fluid, and a flow-through capacitor disposed within the column. The flow-through capacitor comprises a plurality of spirally-wound, stacked washer or rods to include a first electrically conductive backing layer, such as of graphite, and a first high surface area conductive layer secured to one side of the backing layer, such as carbon fibers, and a second high surface area conductive layer secured to the opposite side of the backing layer, the high surface area material layers arranged to face each other and separated by a nonconductive, ion-permeable spacer layer to insulate electrically the backing and conductive layer. The system includes a DC power source to charge the respective conductive layers with different polarities whereby a fluid-containing material passing through the column is purified by the electrically conductive, high surface area stationary phase and the retention thereof onto the high surface area layer and permitting, for example, the purification of aqueous solutions of liquids, such as salt, and providing for the recovery of a purified liquid.

US-PAT-NO: 5547581

DOCUMENT-IDENTIFIER: US 5547581 A

TITLE: Method of separating ionic fluids with a flow through capacitor

DATE-ISSUED: August 20, 1996

US-CL-CURRENT: 210/656; 204/450 ; 204/600 ; 205/742 ;
210/198.2 ; 210/747

APPL-NO: 08/ 439310

DATE FILED: May 11, 1995

PARENT-CASE:

REFERENCE TO PRIOR APPLICATIONS This application is a divisional application of U.S. patent application Ser. No. 08/194,609, filed Feb. 10, 1994, now U.S. Pat. No. 5,415,768, issued May 16, 1995, which is a continuation-in-part of U.S. patent application Ser. No. 08/027,699, filed Mar. 8, 1993, now U.S. Pat. No. 5,360,540, issued Nov. 1, 1994 which is a divisional of U.S. patent application Ser. No. 07/819,828, filed Jan. 13, 1992, now U.S. Pat. No. 5,200,068, issued Apr. 6, 1993, which is a continuation-in-part application of U.S. patent application Ser. No. 07/792,902, filed Nov. 15, 1991, now U.S. patent No. 5,192,42, issued Mar. 9, 1993, which is a continuation of U.S. patent application Ser. No. 07/512,970, filed Apr. 23, 1990, now abandoned. U.S. patent application Ser. No. 07/760,752, a divisional application of U.S. patent application Ser. No. 07/512,970, was filed on Sep. 16, 1991 and is now U.S. Pat. No. 5,196,115, issued Mar. 23, 1993. All of these patents and the co-pending application are hereby incorporated by reference.

----- KWIC -----

Abstract Text - ABTX:

A flow-through capacitor and a controlled charge chromatography column system using the capacitor for the purification of a fluid-containing material, which column comprises an inlet for a fluid to be purified and an outlet for the discharge of the purified fluid, and a flow-through capacitor disposed within the column. The flow-through capacitor comprises a plurality of spirally-wound, stacked washer or rods to include a first electrically conductive backing layer, such as of graphite, and a first high surface area conductive layer secured to one side of the backing layer, such as carbon fibers, and a second high surface area conductive layer secured to the opposite side of the backing layer, the high surface area material layers arranged to face each other and separated by a nonconductive, ion-permeable spacer layer to insulate electrically the backing and conductive layer. The system includes a DC power source to charge the respective conductive layers with different polarities whereby a fluid-containing material passing through the column is purified by the electrically conductive, high surface area stationary phase and the retention thereof onto the high surface area layer and permitting, for example, the purification of aqueous solutions of liquids, such as salt, and providing for the recovery of a purified liquid.

Claims Text - CLTX:

a) introducing the fluid into a flow-through electrical capacitor having a

first and second high surface area electrically conductive material to act respectively as a stationary phase cathode and anode and the first and second high surface area material layers designed to face each other externally on either side of an electrically insulating ion-permeable spacer material layer to form a single anode-cathode unit;

US-PAT-NO: 5415768
DOCUMENT-IDENTIFIER: US 5415768 A

TITLE: Flow-through capacitor

DATE-ISSUED: May 16, 1995

US-CL-CURRENT: 210/198.2; 204/600 ; 204/647 ; 210/243 ;
210/541 ; 210/656

APPL-NO: 08/ 194609

DATE FILED: February 10, 1994

PARENT-CASE:

REFERENCE TO PRIOR APPLICATIONS This application is a continuation-in-part of U.S. patent application Ser. No. 08/027,699, filed Mar. 8, 1993, now U.S. Pat. No. 5,360,590 which is a divisional of U.S. patent application Ser. No. 07/819,828, filed Jan. 13, 1992, now U.S. Pat. No. 5,200,068, issued Apr. 6, 1993, which is a continuation-in-part application of U.S. patent application Ser. No. 07/792,902, filed Nov. 15, 1991, now U.S. Pat. No. 5,192,432, issued Mar. 9, 1993, which is a continuation of U.S. patent application Ser. No. 07/512,970, filed Apr. 23, 1990, now abandoned. U.S. patent application Ser. No. 07/760,752, a divisional application of U.S. patent application Ser. No. 07/512,970, was filed on Sep. 16, 1991 and is now U.S. Pat. No. 5,196,115, issued Mar. 23, 1993. All of these patents and the application are hereby incorporated by reference.

----- KWIC -----

Abstract Text - ABTX:

A flow-through capacitor and a controlled charge chromatography column system using the capacitor for the purification of a fluid-containing material, which column comprises an inlet for a fluid to be purified and an outlet for the discharge of the purified fluid, and a flow-through capacitor disposed within the column. The flow-through capacitor comprises a plurality of spirally-wound, stacked washer or rods to include a first electrically conductive backing layer, such as of graphite, and a first high surface area conductive layer secured to one side of the backing layer, such as carbon fibers, and a second high surface area conductive layer secured to the opposite side of the backing layer, the high surface area material layers arranged to face each other and separated by a nonconductive, ion-permeable spacer layer to insulate electrically the backing and conductive layer. The system includes a DC power source to charge the respective conductive layers with different polarities whereby a fluid-containing material passing through the column is purified by the electrically conductive, high surface area stationary phase and the retention thereof onto the high surface area layer and permitting, for example, the purification of aqueous solutions of liquids, such as salt, and providing for the recovery of a purified liquid.

US-PAT-NO: 5360540
DOCUMENT-IDENTIFIER: US 5360540 A

TITLE: Chromatography system

DATE-ISSUED: November 1, 1994

US-CL-CURRENT: 210/198.2; 210/243 ; 210/541 ; 210/656

APPL-NO: 08/ 027699

DATE FILED: March 8, 1993

PARENT-CASE:

Reference to Prior Application Number This application is a divisional application of U.S. Ser. No. 07/819,828, filed Jan. 13, 1992, now U.S. Pat. No. 5,200,068, issued Apr. 6, 1993, which is a continuation-in-part of U.S. Ser. No. 07/792,902, filed Nov. 15, 1991, now U.S. Pat. No. 5,192,432, issued Mar. 9, 1993, which is a continuation of U.S. Ser. No. 07/512,970, filed Apr. 23, 1990, now abandoned.

----- KWIC -----

Abstract Text - ABTX:

A controlled charge chromatography column for the purification of a fluid-containing material, which column comprises a chromatographic column having an inlet for the introduction of a fluid to be purified and an outlet for the discharge of the purified fluid, and one or more concentrated materials and a flow-through capacitor disposed within the column between the inlet and the outlet, the flow-through capacitor means comprising a plurality of spirally

wound or stacked washer layers to include a first electrically conductive backing layer, such as of graphite, and a first high surface area conductive layer secured to the backing layer, such as composed of porous carbon fibers and a non-conductive, porous spacer layer to electrically insulate the backing and conductive layer and to permit the flow of material therethrough, the flow-through capacitor to be connected to a DC power source to charge the respective conductive layers with different polarities whereby a fluid containing material through the column is purified by the electrically conductive stationary phase and the retention thereof onto the high surface area layer and permitting for example the purification of solutions of liquids, such as salt, and providing for the recovery of a purified liquid.

US-PAT-NO: 5200068

DOCUMENT-IDENTIFIER: US 5200068 A

TITLE: Controlled charge chromatography system

DATE-ISSUED: April 6, 1993

US-CL-CURRENT: 204/645; 204/647 ; 204/671 ; 210/198.2 ;
210/243 ; 210/541

APPL-NO: 07/ 819828

DATE FILED: January 13, 1992

PARENT-CASE:

REFERENCE TO PRIOR APPLICATIONS This application is a
continuation-in-part
patent application of allowed U.S. Ser. No. 07/792,902
filed Nov. 15, 1991
which is a continuation patent application of U.S. Ser.
No. 07/512,970, filed
Apr. 23, 1990, now abandoned.

----- KWIC -----

Abstract Text - ABTX:

A controlled charge chromatography column for the
purification of a
fluid-containing material, which column comprises a
chromatographic column
having an inlet for the introduction of a fluid to be
purified and an outlet
for the discharge of the purified fluid, and one or more
concentrated materials
and a flow-through capacitor disposed within the column
between the inlet and
outlet, the flow-through capacitor means comprising a
plurality of spirally
wound or stacked washer layers to include a first
electrically conductive
backing layer, such as of graphite, and a first high

surface area conductive layer secured to the backing layer, such as composed of porous carbon fibers and a non-conductive, porous spacer layer to electrically insulate the backing and conductive layer and to permit the flow of material therethrough, the flow-through capacitor to be connected to a DC power source to charge the respective conductive layers with different polarities whereby a fluid containing material through the column is purified by the electrically conductive stationary phase and the retention thereof onto the high surface area layer and permitting for example the purification of solutions of liquids, such as salt, and providing for the recovery of a purified liquid.

US-PAT-NO: 5196115

DOCUMENT-IDENTIFIER: US 5196115 A

TITLE: Controlled charge chromatography system

DATE-ISSUED: March 23, 1993

US-CL-CURRENT: 204/645; 204/647 ; 210/198.2 ; 210/243 ;
210/541

APPL-NO: 07/ 760752

DATE FILED: September 16, 1991

PARENT-CASE:

This is a division of Ser. No. 512,970, filed Apr. 23,
1990, now abandoned.

----- KWIC -----

Abstract Text - ABTX:

A controlled charge chromatography column for the purification of a fluid containing materials, which column comprises a chromatographic column having an inlet for the introduction of a fluid to be purified and an outlet for the discharge of the purified fluid, and one or more concentrated materials and a flow-through capacitor disposed within the column between the inlet and the outlet, the flow-through capacitor means comprising a plurality of spirally wound, spaced apart layers to include a first electrically conductive backing layer, such as of graphite, and a first high surface area conductive layer secured to the backing layer, such as composed of porous carbon fibers and a non-conductive, porous spacer layer to electrically insulate the backing and

conductive layer and to permit the flow of material
therethrough, the
flow-through capacitor to be connected to a DC power source
to charge the
respective conductive layers with different polarities
whereby a fluid
containing material through the column is purified by the
electrically
conductive stationary phase and the retention thereof onto
the high surface
area layer and permitting for example the purification of
solutions of liquids,
such as salt, and providing for the recovery of a purified
liquid.

US-PAT-NO: 5192432
DOCUMENT-IDENTIFIER: US 5192432 A

TITLE: Flow-through capacitor

DATE-ISSUED: March 9, 1993

US-CL-CURRENT: 204/665; 204/671 ; 210/198.2 ; 210/243 ;
210/541

APPL-NO: 07/ 792902

DATE FILED: November 15, 1991

PARENT-CASE:

This is a continuation of application(s) Ser. No.
07/512,970 filed on Apr.
23, 1990, now abandoned.

----- KWIC -----

Abstract Text - ABTX:

A controlled charge chromatography column for the purification of a fluid containing materials, which column comprises a chromatographic column having an inlet for the introduction of a fluid to be purified and an outlet for the discharge of the purified fluid, and one or more concentrated materials and a flow-through capacitor disposed within the column between the inlet and the outlet, the flow-through capacitor means comprising a plurality of spirally wound, spaced apart layers to include a first electrically conductive backing layer, such as of graphite, and a first high surface area conductive layer secured to the backing layer, such as composed of porous carbon fibers and a non-conductive, porous spacer layer to electrically

insulate the backing and
conductive layer and to permit the flow of material
therethrough, the
flow-through capacitor to be connected to a DC power source
to charge the
respective conductive layers with different polarities
whereby a fluid
containing material through the column is purified by the
electrically
conductive stationary phase and the retention thereof onto
the high surface
area layer and permitting for example the purification of
solutions of liquids,
such as salt, and providing for the recovery of a purified
liquid.

US-PAT-NO: 3669881

DOCUMENT-IDENTIFIER: US 3669881 A

TITLE: THIN LAYER CHROMATOGRAPHIC METHOD

DATE-ISSUED: June 13, 1972

US-CL-CURRENT: 210/658

APPL-NO: 04/ 854456

DATE FILED: September 2, 1969

----- KWIC -----

Claims Text - CLTX:

12. A method as claimed in claim 11, wherein an electrically non-conductive liquid is used as the mobile phase, and said surface is an electrically insulating surface used as a stationary phase.

	U	1	Document ID	Issue Date	Pages
1	<input type="checkbox"/>	<input type="checkbox"/>	US 5748437 A	19980505	18
2	<input type="checkbox"/>	<input type="checkbox"/>	US 5547581 A	19960820	16
3	<input type="checkbox"/>	<input type="checkbox"/>	US 5415768 A	19950516	17
4	<input type="checkbox"/>	<input type="checkbox"/>	US 5360540 A	19941101	10
5	<input type="checkbox"/>	<input type="checkbox"/>	US 5200068 A	19930406	10
6	<input type="checkbox"/>	<input type="checkbox"/>	US 5196115 A	19930323	8
7	<input type="checkbox"/>	<input type="checkbox"/>	US 5192432 A	19930309	9
8	<input type="checkbox"/>	<input type="checkbox"/>	US 3669881 A	19720613	8

	Title	Current OR	Current XRef
1	Fluid separation system with flow-through capacitor	361/302	204/600; 204/647; 204/671; 210/198.2; 210/656
2	Method of separating ionic fluids with a flow through capacitor	210/656	204/450; 204/600; 205/742; 210/198.2; 210/747
3	Flow-through capacitor	210/198.2	204/600; 204/647; 210/243; 210/541; 210/656
4	Chromatography system	210/198.2	210/243; 210/541; 210/656
5	Controlled charge chromatography system	204/645	204/647; 204/671; 210/198.2; 210/243; 210/541
6	Controlled charge chromatography system	204/645	204/647; 210/198.2; 210/243; 210/541
7	Flow-through capacitor	204/665	204/671; 210/198.2; 210/243; 210/541
8	THIN LAYER CHROMATOGRAPHIC METHOD	210/658	

	Retrieval Classif	Inventor	S	C	P	2	3	4	5
1		Andelman, Marc D.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2		Andelman, Marc D.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3		Andelman, Marc D.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4		Andelman, Marc D.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5		Andelman, Marc D.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6		Andelman, Marc D.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7		Andelman, Marc D.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8		Cremer, Erika et al.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Image Doc. Displayed	PT
1	US 5748437	<input type="checkbox"/>
2	US 5547581	<input type="checkbox"/>
3	US 5415768	<input type="checkbox"/>
4	US 5360540	<input type="checkbox"/>
5	US 5200068	<input type="checkbox"/>
6	US 5196115	<input type="checkbox"/>
7	US 5192432	<input type="checkbox"/>
8	US 3669881	<input type="checkbox"/>

US-PAT-NO: 3640813

DOCUMENT-IDENTIFIER: US 3640813 A

TITLE: ADAPTER FOR A MACROMOLECULE SEPARATION DEVICE

DATE-ISSUED: February 8, 1972

US-CL-CURRENT: 204/615; 204/606 ; 210/198.2 ; 210/635 ;
210/656

APPL-NO: 04/ 831509

DATE FILED: June 9, 1969

----- KWIC -----

Detailed Description Text - DETX:

Adapter 12 includes an open tubular housing 14 and an electrically conductive, self-supporting solidified gel 16 formed therein. The housing is formed at its upper end into an externally threaded enlarged portion 18. Since an electric current passes through the gel, the housing should be formed from an electrical insulator, suitably acrylic plastic. Grooves 20 may be provided on inner surface 22 of the housing to aid in retaining gel 16, which is flush against surface 22, in a fixed position. Housing 14 is provided with inlet and outlet ports 24 and 26, respectively, to which are affixed inlet and outlet spouts 28 and 30, respectively.

Current US Cross Reference Classification - CCXR:

210/198.2

	Type	L #	Hits	Search Text	DBs	Time Stamp
1	BRS	L1	94884	electric\$5 near insulat\$5	USPAT	2002/12/03 16:08
2	BRS	L2	8	(electric\$5 near insulat\$5) same (stationary adj phase)	USPAT	2002/12/03 16:18
3	BRS	L3	1659	210/198.2.ccls.	USPAT	2002/12/03 16:18
4	BRS	L4	39	1 and 3	USPAT	2002/12/03 16:18

	Comments	Error Definition	Errors
1			0
2			0
3			0
4			0

	Type	L #	Hits	Search Text	DBs	Time Stamp
1	BRS	L1	94884	electric\$5 near insulat\$5	USPAT	2002/12/03 16:08
2	BRS	L2	8	(electric\$5 near insulat\$5) same (stationary adj phase)	USPAT	2002/12/03 16:18
3	BRS	L3	1659	210/198.2.ccls.	USPAT	2002/12/03 16:18
4	BRS	L4	39	1 and 3	USPAT	2002/12/03 16:18

	Comments	Error Definition	Errors
1			0
2			0
3			0
4			0

L Number	Hits	Search Text	DB	Time stamp
1	94884	electric\$5 near insulat\$5	USPAT	2002/12/03 16:08
2	8	(electric\$5 near insulat\$5) same (stationary adj phase)	USPAT	2002/12/03 16:18
3	1659	210/198.2.ccls.	USPAT	2002/12/03 16:18
4	39	(electric\$5 near insulat\$5) and 210/198.2.ccls.	USPAT	2002/12/03 16:18

L Number	Hits	Search Text	DB	Time stamp
1	94884	electric\$5 near insulat\$5	USPAT	2002/12/03 16:08
2	8	(electric\$5 near insulat\$5) same (stationary adj phase)	USPAT	2002/12/03 16:18
3	1659	210/198.2.ccls.	USPAT	2002/12/03 16:18
4	39	(electric\$5 near insulat\$5) and 210/198.2.ccls.	USPAT	2002/12/03 16:18